March 19, 2018

Mr. Barnes Johnson
Director
Office of Resource Conservation and Recovery
U.S. Environmental Protection Agency
1220 Pennsylvania Avenue, NW
Mail Code 5301P
Washington, DC 20460

RE: Request for Regulatory Interpretation:
Consideration of Medium- and High-Density Polyethylene to be Non-Porous Surfaces under 40 CFR 761.3

Dear Mr. Johnson:

The American Gas Association (AGA), on behalf of its members, respectfully requests that the United States Environmental Protection Agency (EPA) issue an interpretive letter confirming that high- and medium-density polyethylene is a “non-porous surface” as defined in 40 CFR §761.3 for purposes of wipe sampling for waste profiling under 40 CFR §761.60 and decontamination under 40 CFR §761.79. Eliminating this regulatory uncertainty will preserve PCB landfill space for materials that pose an unreasonable risk, encourage recycling, and reduce regulatory burdens on the energy sector.

I. Background

Natural gas distribution companies that are subject to the ≥50 ppm PCB use authorization under 40 CFR 761.30(i)(1)(iii) must test any pipe for PCB contamination prior to abandonment or removal for disposal. The detected level of PCBs largely dictates which disposal options are available for the pipe when it is removed from service. But the testing method depends on whether the pipe is considered non-porous or porous. In particular, EPA has specified that its standard wipe sampling method at 40 CFR 761.123 is appropriate for non-porous surfaces.

The 1998 PCB Disposal Amendments defined a “porous surface” as “any surface that allows PCBs to penetrate or pass into itself.” The designated examples included “low-density plastics such as styrofoam and low-density polyethylene.” A “non-porous surface,” on the other hand, is “a smooth, unpainted solid surface that limits penetration

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1 The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 73 million residential, commercial and industrial natural gas customers in the U.S., of which 95 percent — more than 69 million customers — receive their gas from AGA members. Today, natural gas meets more than one-fourth of the United States' energy needs.

of liquid containing PCBs beyond the immediate surface” such as “natural gas pipe with a thin porous coating originally applied to inhibit corrosion” and “high density plastics.” During the rulemaking process leading up to the 1998 PCB Disposal Amendments, several commenters on the draft rule suggested that the term “high density plastics” should be quantified to allow a determination as to whether a plastic could be considered non-porous. EPA deferred this issue, indicating that it did not receive any comments on performance criteria to use for defining “high density” or any density polyethylene (PE).

When EPA established the use authorization for natural gas pipe, most gas distribution piping was metal and therefore non-porous. Since then, however, much of the cast iron and steel natural gas distribution pipe in the US has been (and continues to be) replaced with medium and high-density polyethylene pipe (MDPE and HDPE, respectively). As an engineering and pipeline safety matter, the natural gas industry considers MDPE and HDPE pipe to be non-porous by virtue of its ability to contain natural gas.

The Plastic Pipe Institute has published performance criteria for different PE pipe categories, as follows:

- **High-Density Polyethylene (HDPE)** - A plastic resin made by the copolymerization of ethylene and a small amount of another hydrocarbon. The resulting base resin density, before additives or pigments, is greater than 0.941 g/cm$^3$.

- **Medium Density Polyethylene Plastics (MDPE)** - Those branched polyethylene plastics, having a standard density of 0.926 to 0.940 g/cm$^3$.

- **Low-Density Polyethylene Plastics (LDPE)** - Polyethylene plastics, having a standard density of 0.910 to 0.925 g/cm$^3$.

MDPE and HDPE pipe are not expressly addressed in the Part 761 regulations. Low density PE (LDPE)—which is not used for natural gas pipe—is considered porous, and MDPE and HDPE are denser, so they could be considered non-porous by implication. But neither MDPE nor HDPE is mentioned in the definition of non-porous surfaces. And as noted above, the regulations do not provide a standard for determining whether any given material is porous or non-porous. A definitive interpretation that MDPE and HDPE are indeed non-porous would resolve this regulatory uncertainty and give companies clear direction to wipe sample such materials to determine which disposal and recycling options are available.

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II. Research Supporting the Request

To support a determination that MDPE and HDPE are non-porous, AGA member company National Grid worked with NYSEARCH to design a rigorous laboratory research study in 2010 and to conduct the study over the ensuing seven years. The primary study goals were to determine: (a) whether MDPE or HDPE pipe absorbs the types of PCBs found in gas systems when dissolved in pipeline condensate (liquid hydrocarbons); and (b) if so, the extent to which, and time frame over which, absorption occurs.

Reports containing the findings of the research were provided to USEPA staff and the results were presented in person during working meetings in 2015 and 2017. An electronic copy of the final report\(^6\) is provided with this letter. The methodology and results of the research are summarized below.

A. Methodology

To characterize the behavior of PCBs in PE pipe, an exposure methodology was developed involving immersion of PE chips of pipe material in a kerosene/solvent solution simulating pipeline condensate. Sampling protocols ensured that the cutting process would not introduce any thermal interaction or influence on any PCBs present in the PE pipe samples. The report describes the test piece (or “chip”) preparation methodology as follows.

“Test Piece Preparation - Pipe samples with nominal diameters between 2” and 8” were used to prepare the test pieces. The test piece[s] were prepared from the inner surface of the pipe to obtain a mass of 0.075 +/- 0.0075 g and the dimensions were adjusted accordingly to meet this specification. This resulted in test pieces with nominal dimensions of 0.25” width x 0.25” length x 0.98” thickness. Specimens were cut from the pipe sample using a razor blade to avoid thermally induced changes to the pipe microstructure due to other preparation techniques such as sawing or grinding. Changes in the pipe microstructure could potentially result in modified mass transport for the test piece relative to the original pipe material.”

The soaking solutions contained a PCB concentration of 500 ppm of both Aroclor 1242 (the type of PCB most commonly found in natural gas systems)\(^7\) and Aroclor 1268 (for comparative purposes).

The study was designed to determine the relative significance of mass transport variables such as pipe material, pipe age, PCB type, PCB concentration, temperature, and exposure time. Pipe materials included new MDPE and HDPE, old HDPE and MDPE\(^8\), and Low Ductile


\(^7\) PCB levels in pipelines are usually much lower.

\(^8\) To evaluate aged PE plastic pipe, the researchers tested 23-year old MDPE pipe removed from field service containing no measurable PCBs.
Inner Wall (LDIW) Aldyl A. The chips remained immersed for varying periods of time and at temperatures of 140F and 68F, to artificially accelerate the absorption effects and to simulate aging.

Two laboratories, both certified in USEPA testing methods, performed testing independently following the same methodology and test protocol. They prepared and populated test grids over the course of sample exposures as prescribed in USEPA PCB extraction and analysis methods:

i. EPA Method 3540C and 3541, PCB extraction; and
ii. EPA Method 8082 and 8082A, Analysis.

B. Results

It was hypothesized that (1) the transport of PCBs from condensate to the PE would be dominated by diffusion of PCBs into the PE, meaning that PCB absorption would increase linearly with time to an apparent plateau, and (2) absorption would increase with temperature and decrease with increasing PCB chlorine content. The actual test data confirmed these behaviors, and demonstrated that the absorption rate was similar for all PE materials, including old pipe.

PCB penetration into the PE was then modeled, and PCB penetration extrapolated to simulate lower temperatures common to natural gas systems and longer exposure times consistent with the expected service life of the pipe. The model shows:

1. That the PCB concentration in the inner (most exposed) 0.08” of PE would remain below 3 mg/kg for a pipe 1% full of 500 ppm PCB at normal underground system operating temperature for 50 years; and
2. That almost all residual PCBs would remain available on the inner pipe surface and not be appreciably absorbed, confirming that MDPE and HDPE are nonporous, and that wipe sampling is as reliable an indicator of PCB contamination of MDPE and HDPE pipe as it is for metal pipe.

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9 Aldyl A pipe is no longer in use, as it has been replaced with modern MDPE and HDPE pipe across the industry. However, Adyl A samples were originally included to test the full range of plastic pipe used in the gas industry, both historically and currently.

10 Typical operating temperatures for buried gas pipe are 32F to 68F.

11 Use of 1% of the cross sectional area of the pipe as the basis for so-called “liquid holdup is a reasonable maximum for the following reasons. PCBs in gas distribution systems, if present, are dissolved in small amounts of liquid hydrocarbon pipeline condensates that flow along the bottom of the pipe due to low gas velocities. Hydrocarbon liquid levels in distribution pipes are kept low for operational reasons, and systems have become drier as pipeline quality natural gas has become drier (i.e. it contains much lower amounts of liquid heavy hydrocarbons). As small amounts of hydrocarbon liquid would stream and settle along the bottom of the pipe, no more than 1% by volume would remain in the pipe. In addition, for operational reasons, drip pots are typically placed at low points periodically along a distribution pipeline to capture liquids. Utilities monitor liquid levels and remove liquids from drip pots, thereby removing liquids from the pipe.
Researchers concluded from these results that MDPE and HDPE behave much like metal in terms of porosity, and should be considered a “non-porous surface” as defined in the PCB regulations.

III. Communication of the Technical Findings with USEPA

As noted above, USEPA staff met on two occasions\textsuperscript{12} with the research team to review and comment on the findings. The research team participants included representatives of AGA, NYSEARCH (the manager of the research), and National Grid (primary sponsor of the research).

A. First Phase Testing & Initial 2015 Meeting

The first phase of testing in 2015 focused on virgin PE pipe that had never been used for gas distribution. Results of this first phase of testing were presented to USEPA at an initial meeting in 2015.

At the initial meeting in 2015, USEPA suggested a second phase to expand the testing to include some aged in-service pipe.

B. Second Phase Testing & 2017 Meeting

In response to EPA’s request for further data regarding aged in-service pipe, National Grid located and removed from service samples of 23-year-old PE pipe, which the research team then tested and shaved to remove any trace of PCB from the inner surface of the pipe, and then chipped and subjected to the same testing regimen used in the first phase of testing. The purpose of testing aged 23-year-old MDPE pipe was specifically to understand how this vintage material behaved under the same test regiment as the original materials tested. The outer layer of the pipe’s interior wall was removed (by precise shaving) to prevent any influence of operational exposure that could otherwise have skewed its behavior in the test (i.e., through gas “pickling”, odorant contact effects, or liquid hydrocarbon condensates). Removing the outer surface provided an uncontaminated 23-year-old pipe material unaffected by any gas condition.

The test results, which demonstrated that pipe age did not diminish PE performance, were then shared with USEPA staff at the second meeting in November 2017. Reports were prepared documenting the first set of tests in 2015\textsuperscript{13} and the complete set of tests in 2017.\textsuperscript{14} Those reports were provided to USEPA. At the second meeting, USEPA also requested information documenting the comparative analysis of analytical results between the two laboratories. That analysis was provided to USEPA staff separately.

\textsuperscript{12} The meetings were held on July 29, 2015 and November 7, 2017.


\textsuperscript{14} Assessment of Polychlorinated Biphenyls (PCBs) in Polyethylene (PE) Gas Distribution Piping, JANA Project 11-1348, Final Report Revision 1, Confidently submitted to NYSEARCH NGA (August 4, 2017).
IV. Benefits of an Interpretive Letter

The benefits of an interpretation concluding that MDPE and HDPE are non-porous would be significant for the environment, USEPA and the natural gas industry.

A. Environmental Benefits

1. Reduce Volume of Pipe Filling Precious PCB Landfill Space

Concerned over the regulatory classification of MDPE and HDPE pipe, most AGA member companies subject to the ≥50 ppm PCB use authorization are assuming that out-of-service plastic pipe is regulated as PCB waste. Confirmation that wipe sampling is permissible would allow companies to consider disposing of PE pipe as municipal solid waste or sending the pipe to a recycling facility. It bears emphasizing that used PE pipe containing no regulated levels of PCB typically is otherwise clean and is an attractive plastic product in the recycling market. Keeping PE pipe out of landfills would be consistent with one of the original drivers for the 1998 PCB Disposal Amendments, which were intended to minimize disposal of steel natural gas pipe (“large volume PCB items”) in limited PCB landfill space.\(^\text{15}\) Use of PE pipe is relatively new compared to metal, so the benefits of an interpretation would be magnified in the decades to come as PE pipe ages and is scheduled for removal and replacement.

2. Reduce Virgin Materials Needed to Manufacture New Pipe

Recycling used PE pipe to manufacture new PE pipe will also reduce the amount of virgin materials that are used in pipe manufacturing, which provides an additional environmental benefit.

B. Economic, Regulatory and Energy Benefits

1. Reduce Regulatory Burden and Cost

The proposed interpretive letter represents an opportunity to eliminate an existing regulatory disposal restriction in compliance with Executive Order 13771 “Reducing Regulation and Controlling Regulatory Costs” signed Jan. 30, 2017 and Executive Order 13777 “Enforcing the Regulatory Reform Agenda” signed Feb. 24, 2017. It represents an opportunity to modernize the interpretation and implementation of a rule promulgated almost 20 years ago that could not have anticipated the rapid evolution of PE pipe as the dominant natural gas distribution piping material. The proposed change would result in a decrease in disposal costs with no increase in risk to human health or the environment. The cost benefit will continue to increase each year as more and more PE pipe is removed from service.

2. Reduce Burdens on Domestic Energy Consumers

For the reasons mentioned above, the proposed consideration would avoid further burdening domestically produced energy resources in accordance with Executive Order 13783 “Promoting Energy Delivery and Economic Growth” signed March 28, 2017. Specifically, in light of the growing future volume and cost of PE pipe disposal, providing an interpretive letter confirming

that PE pipe qualifies as non-porous and may be wipe sampled will yield an increasing cost reduction benefit every year going forward. This will help support the delivery of affordable, U.S. domestic energy to American families and businesses. Historical data from the research sponsor, National Grid, show that over 80% of their metal pipe wipe samples are below the regulatory threshold for disposal and allow recycling. However, today, absent confirmation that wipe sampling is permissible for PE pipe, 0% of their PE pipe would be available for recycling.

V. Conclusion

AGA and its members have identified an area of the regulations -- sampling of PE pipe for disposal/recycling -- as one that increasingly deserves clarification. In response to suggestions from USEPA almost 20 years ago, industry members have invested in a robust research program that showed that the predominant types of plastic pipe being installed today in modern natural gas distribution systems, MDPE and HDPE, are nonporous and can be sampled in the same manner as metal pipe. Agreeing to this regulatory interpretation will allow a dramatic increase in beneficial plastic recycling in the coming years, and will allow USEPA to demonstrate its ability to reinterpret the regulations in response to new, better technology and sound research.

AGA asks that USEPA issue an interpretive letter confirming medium- and high-density polyethylene to be nonporous under 40 CFR 761.3, particularly as it applies to wipe sampling and decontaminating used natural gas pipe.

Respectfully submitted,

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